

WHAT IS CLAIMED IS:

1. A starter comprising:

a motor generating a rotation force; and

a planetary reduction gear device that reduces a speed of rotation of the motor, wherein

the planetary reduction gear device has a planet carrier forming gear shafts projecting from a surface of the planet carrier and a plurality of planetary gears supported by the gear shafts, and

the planet carrier further forming projections projecting in a direction same as that of the gear shafts.

2. The starter according to claim 1, wherein each of the projections is in a form of pin.

3. The starter according to claim 1, wherein

the gear shafts are arranged on a first circle having a center that is coincident with a rotation axis of the planet carrier and the projections are arranged on a second circle having a center that is coincident with the rotation axis of the planet carrier, wherein the second circle has a diameter different from that of the first circle.

4. The starter according to claim 1, wherein the projections are disposed at positions without interfering with the planetary gears supported on the gear shafts.

5. The starter according to claim 1, wherein

the planet carrier has a heat-treated layer on its surface including surfaces of the gear shafts and the projections, and

the heat treated layer has a hardness equal to or higher than 50 HRC and is formed by heat treatment.

6. The starter according to claim 1, wherein each of the gear shafts and the projections is disposed such that a base portion connecting to the surface of the planet carrier forms a rounded corner.

7. The starter according to claim 1, further comprising:

a one-way clutch having a clutch outer portion and a clutch inner portion, wherein

the clutch outer portion is disposed to receive the rotation from the planetary reduction gear device and transmit the rotation to the clutch inner portion, and

the clutch outer portion is connected to the planet carrier so that the clutch outer portion rotates with the planet carrier.

8. The starter according to claim 1, further comprising:

a one-way clutch having a clutch outer portion and a clutch inner portion, wherein

the clutch outer portion is disposed to receive the rotation from the planetary reduction gear device and transmit

the rotation to the clutch inner portion, and

the clutch outer portion is integrally formed into the planet carrier.

9. The starter according to claim 1, wherein the planet carrier forming the gear shafts and the projections is formed by cold forging.

10. The starter according to claim 1, wherein the planet carrier has a continuous metal flow from itself to the gear shafts and the projections.

11. The starter according to claim 1, further comprising:  
an output shaft for outputting the rotation, wherein the planet carrier is provided as a part of the output shaft; and  
a one-way clutch disposed slidable on the output shaft.

12. The starter according to claim 3, wherein each of the gear shafts and the projections is disposed such that a base portion connecting to the surface of the planet carrier forms a rounded corner.

13. The starter according to claim 3, further comprising:  
a one-way clutch having a clutch outer portion and a clutch inner portion, wherein

the clutch outer portion is disposed to receive the rotation from the planetary reduction gear device and transmit

the rotation to the clutch inner portion, and

the clutch outer portion is connected to the planet carrier so that the clutch outer portion rotates with the planet carrier.

14. The starter according to claim 3, further comprising:

a one-way clutch having a clutch outer portion and a clutch inner portion, wherein

the clutch outer portion is disposed to receive the rotation from the planetary reduction gear device and transmit the rotation to the clutch inner portion, and

the clutch outer portion is integrally formed into the planet carrier.